REMARKS

Applicant would like to thank the Examiner for the careful consideration given the present application. The application has been carefully reviewed in light of the Office action, and amended as necessary to more clearly and particularly describe the subject matter which applicant regards as the invention.

Claims 1, 3, 12, and 13 were rejected under 35 U.S.C. 103(a) as being unpatentable over Alastair et al. (U.S. Patent No. 3,418,662) in view of McBean et al. (U.S. Patent No. 7,367,958). The rejections are traversed for the following reasons.

The invention defined in claim 1 is directed to an external force control method for controlling an external force applied to an animal through an orthosis attached to the animal that makes a movement along with the activities of muscle fibers. Simply stated, the method of claim 1 first utilizes the myoelectric potential (x) as a signal to trigger the orthosis (by providing the variable for the external force function f(x)). While the external force is applied to the animal, a ratio of the external force to the total force exerted by the animal and the orthosis is determined (external force/(external force + internal force)). If too much external force is applied to the animal relative to the total force, then the external force is changed according to a second external force function so as to reduce the external force.

In this regard, it is noted that while the myoelectric potential is used to trigger the orthosis and as a variable in setting the external force, the change of the external force is triggered by the determination that the amount of external force exceeds a target proportion relative to the total force. Such a determination triggers the setting

of a new external force function such that that proportion of the external force to the total force approaches the target proportion.

As will be shown below, the combined references, at best, rely on the detection of EMG signals for setting the external force and for triggering a change in the external force. Accordingly, the external force is changed only as the EMG signals vary. Consequently, the combined references do not teach or suggest using myoelectric potential to set an external force function and a ratio of external force to total force as a means for determining that a new external force function is to be set.

With initial reference to the Alastair patent, the invention defined therein is directed to a control system for a prosthetic hand. The control system teaches that EMG signals are obtained from the flexor and extensor muscles via input electrodes (1, 2) provided to the forearm of the agent. The movement of the artificial hand is controlled based on the EMG signals. Alastair, Col. 2, lines 18 – 64, Figs. 1 and 2.

While Alastair teaches measuring of EMG signals and using the EMG signals to control a device attached to a user's body, the similarities between the claimed invention and Alastair end there. Alastair does not teach a method including a device that applies an external force to an animal. Rather, the Alastair prosthetic hand takes the place of the part of the animal to which the external force would be applied. Further in this vein, and contrary to the Examiner's assertions, Alastair does not teach setting a value of an external force applied to the animal through an orthosis. Alastair does not apply an external force to an animal, and therefore cannot teach or suggest setting a value of an external force that is to be applied to the animal. Further, Alastair is silent as to measuring a motion variable, wherein the motion variable is a sum of an external force and an internal force. Again, Alastair is

only directed to the operation of a prosthetic hand, and, depending on whether the movement of the prosthetic hand is deemed to be an internal force or an external force, only measures one of said forces. Further still, as Alastair is only concerned with one of said forces, Alastair is silent as to setting a factor that is a ratio between an external applied force and the motion variable (total force). As the Alastair control system is silent as to the determination of the factor, Alastair is similarly silent as to a target factor and the comparison of the factor with the target factor. Finally, as conceded by the Examiner, Alastair is silent as to setting a new force function if the comparison of the factor to the target factor yields a result in a specified range.

As a *prima facie* case of obviousness requires the combined references to teach or suggest each and every feature of the claimed invention, the above list of shortcomings of the Alastair patent must be remedied by the McBean reference for the obviousness rejection of claim 1 to be proper.

In contrast to the Alastair patent, McBean is directed to a control method for an orthotic device. The orthotic device of McBean determines an intended muscular force via surface EMG sensors, force sensors, position sensors, velocity sensors, or some combination thereof. The force exerted by the externally worn brace can be selected such that it is proportional to a function of the magnitude of the sensor signals. McBean, Col. 4, lines 14 – 31.

However, McBean is silent as to the determination of a ratio of the external force to the total force. In this vein, McBean does not teach or suggest setting a function to determine the external force such that (external force) / (internal force + external force) equals a target value (where the feedback coefficient changes), as is required by claim 1.

Further, as McBean does not consider the ratio of the external force to the total force, it follows that McBean does not teach or suggest setting a target ratio of external force to total force. Stemming from these shortcomings, McBean also does not teach or suggest that a new external force is set when a comparison of the ratio to the target ratio yields a specified value. Rather, the external force applied to the user through the orthotic of McBean is solely dependent upon the magnitude of the sensor signals. As the sensor signals change, so to does the external force.

Thus, McBean does not teach or suggest the factor setting step of claim 1, the determining step of claim 1, and the external force function setting step of setting a new external force function of claim 1. Further, these features are not taught or suggested by the Alastair patent, nor can the features be met by modifying either of the references with the teachings of the other.

Accordingly, the combined references fail to teach or suggest each and every feature recited in claim 1. Therefore, a *prima facie* case of obviousness has not been established to support the rejection of claim 1. Reconsideration and withdrawal of the rejection of claim 1 is requested. Claims 3 and 12 depend from claim 1 and are therefore likewise considered allowable over the art.

With reference to claim 13, the invention defined therein is directed to an apparatus associated with the method defined in claim 1. Accordingly, the arguments presented above in favor of the patentability of claim 1 are considered relevant to claim 13. While the arguments will not be repeated, they are hereby incorporated in full.

As with claim 1, claim 13 recites features that are not taught or suggested by the combined references. Therefore, a *prima facie* case of obviousness has not

been established to support the rejection of claim 13. Reconsideration and withdrawal of the rejection of claim 13 is requested.

Claims 2 and 5 were rejected under 35 U.S.C. 103(a) as being unpatentable over Alastair and McBean as applied to claim 1, and in further view of Curcie et al. (U.S. Patent No. 6,660,042). The rejections are traversed for the following reasons.

Claims 2 and 5 depend from claim 1. Therefore, to render claims 2 and 5 obvious, the combined references must teach or suggest all features of claim 1. In this regard, the shortcomings of the Alastair and McBean patents have been discussed above.

The Curcie patent is cited for teaching a method for distributing forelimb forces in which each finger is assigned a coefficient or weight related to the external force. Further Curcie is cited for teaching a method in which there is a training mode in which the function variables are determined in a training step and then the mode is switched to a use mode in which the equation for each finger remains constant.

However, Curcie fails to remedy the shortcomings of Alastair and McBean in regards to claim 1. Accordingly, claim 1 recites features that are not taught or suggested by the combination of Alastair, McBean, and Curcie. Therefore, claim 1 is not rendered obvious by the combined references. Consequently, claims 2 and 5, based on their dependence from claim 1, are considered allowable over the art. Reconsideration and withdrawal of the rejections of claims 2 and 5 is requested.

Claim 4 was rejected under 35 U.S.C. 103(a) as being unpatentable over Alastair and McBean as applied to claims 1 and 3, and in further view of Haslam, II et al. (U.S. Patent No. 5,413,611). The rejection is traversed for the following reasons.

Claim 4 depends from claim 1. Therefore, to render claim 4 obvious, the combined references must teach or suggest all features of claim 1. In this regard, the shortcomings of the Alastair and McBean patents have been discussed above.

The Haslam patent is cited for teaching a force control method in which the external force is controlled in such a way that the maximum measured force approaches the maximum target. However, Haslam fails to remedy the shortcomings of Alastair and McBean in regards to claim 1.

Accordingly, claim 1 recites features that are not taught or suggested by the combination of Alastair, McBean, and Haslam. Therefore, claim 1 is not rendered obvious by the combined references. Consequently, claim 4, based on its dependence from claim 1, is considered allowable over the art. Reconsideration and withdrawal of the rejections of claim 4 is requested.

Claims 7 and 8 were rejected under 35 U.S.C. 103(a) as being unpatentable over Alastair and McBean as applied to claim 1, and in further view of Kawai et al. (US 2004/0107780). The rejections are traversed for the following reasons.

Claims 7 and 8 depend from claim 1. Therefore, to render claims 7 and 8 obvious, the combined references must teach or suggest all features of claim 1. In this regard, the shortcomings of the Alastair and McBean patents have been discussed above.

The Kawai application is cited for teaching a an external force control method in which primitive variables are measured and inputted to an inverse dynamics model along with motion state data in order to determine the motion state. However, Kawai fails to remedy the shortcomings of Alastair and McBean in regards to claim 1.

Accordingly, claim 1 recites features that are not taught or suggested by the combination of Alastair, McBean, and Curcie. Therefore, claim 1 is not rendered obvious by the combined references. Consequently, claims 7 and 8, based on their dependence from claim 1, are considered allowable over the art. Reconsideration and withdrawal of the rejections of claims 7 and 8 is requested.

Claims 9 – 11 and 14 were rejected under 35 U.S.C. 103(a) as being unpatentable over Alastair and McBean as applied to claim 1, and in further view of Davalli et al. (U.S. Patent No. 6,740,123). The rejections are traversed for the following reasons.

Claims 9 - 11 depend from claim 1. Therefore, to render claims 9 – 11 obvious, the combined references must teach or suggest all features of claim 1. In this regard, the shortcomings of the Alastair and McBean patents have been discussed above.

The Davalli patent is cited for teaching four band factors each depending from the bend of the wrist and EMG activity feedback which results in different force controls. However, Davalli fails to remedy the shortcomings of Alastair and McBean in regards to claim 1.

Accordingly, claim 1 recites features that are not taught or suggested by the combination of Alastair, McBean, and Davalli. Therefore, claim 1 is not rendered obvious by the combined references. Consequently, claims 9 – 11, based on their dependence from claim 1, are considered allowable over the art. Reconsideration and withdrawal of the rejections of claims 9 – 11 is requested.

Claim 14 is directed to an external force control program for providing a computer with functions for controlling an external force applied to an animal through

an orthosis attached to the animal that makes a movement along with the activities of muscle fibers. Essentially, claim 14 is directed to a control program that instructs a computer to perform method steps similar to those recited in claim 1.

As the inventive method of claim 14 is similar to that of claim 1, the arguments presented above in favor of the patentability of claim 1 are considered relevant to the rejection of claim 14. Accordingly, while not repeated, the arguments are hereby incorporated in full. Therefore, as with claim 1, claim 14 recites features that are not taught or suggested by the Alastair and McBean patents. Further, as asserted above, Davalli does not remedy the shortcomings of Alastair and McBean in regards to claim 14.

Consequently, claim 14 is not rendered obvious by the combined references. Reconsideration and withdrawal of the rejection of claim 14 is requested.

In light of the foregoing, it is respectfully submitted that the present application is in a condition for allowance and notice to that effect is hereby requested. If it is determined that the application is not in a condition for allowance, the Examiner is invited to initiate a telephone interview with the undersigned attorney to expedite prosecution of the present application.

If there are any additional fees resulting from this communication, please charge same to our Deposit Account No. 18-0160, our Order No. SAT-16887.

Respectfully submitted,

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